Hellma® Analytics
High Precision in Spectro-Optics

IMMERSION PROBE CONFIGURATOR

More than **500,000** options to build your individual immersion probe.

www.myPATprobe.com

// Optical Immersion Probes
// Fiber Optical Flow Cells

FOR **UV/VIS/NIR SPECTROSCOPY**

SOLUTIONS FOR: PHARMA, AGRICULTURE, CHEMISTRY, POLYMER, FOOD & FEED, BEVERAGE, OIL & GAS, WATER

Optical Immersion Probes and Fiber Optical Flow Cells.

IMMERSION PROBES AND FLOW CELLS SUPPORT ENGINEERS, RESEARCHERS AND ANALYSTS IN SEVERAL FIELDS WHERE PROCESS EFFICIENCY IS REQUIRED.

// CHEMICAL AND PETROCHEMICAL INDUSTRY
// PHARMACY AND LIFE SCIENCE
// FOOD AND BEVERAGE
// POLYMERS

Hellma Analytics offers a broad product range and 90 years of unique manufacturing experience.

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STANDARD PRODUCTS

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MODULAR PROGRAM

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ATR	// KATANA	PAGE **18**
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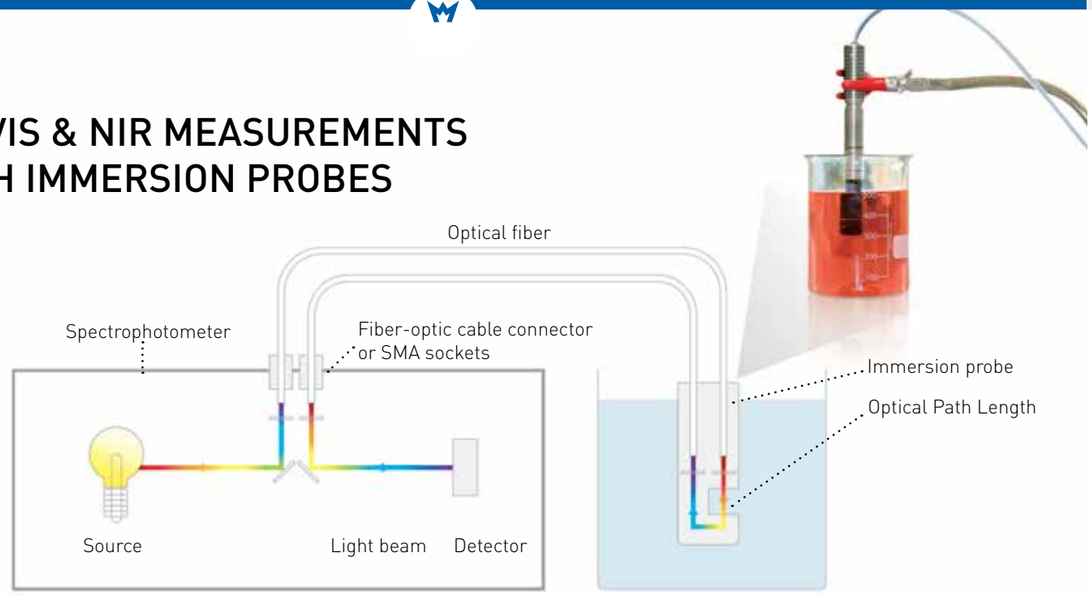
CUSTOM PRODUCTS

PRODUCT OVERVIEW	PAGE **22**

UV/VIS & NIR MEASUREMENTS WITH IMMERSION PROBES



BENEFITS

// Higher process efficiency and performance
// Simple and safe process monitoring
// Optimal control of complex reaction processes
// Proactive process and quality management
// Provable enhanced product and measurement quality
// Fast return on investment
// Professional consulting from highly educated engineers

COMMON FIELDS OF APPLICATION

QUALITATIVE AND QUANTITATIVE PRODUCT ANALYSIS AND DETERMINATION OF CHEMICAL AND PHYSICAL PARAMETERS

// Hydroxyl number
// Acid number
// Peroxide number
// Iodine number
// Octane rating
// Fractioning control
// Aromatics content
// Alcohol concentration
// Caffeine
// Amino acids
// Moistness, proteins and oil content in foods
// Fat, water, lactose and solids in milk

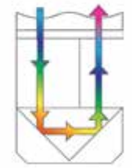
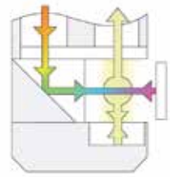
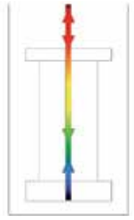
REACTION MONITORING AND REACTION ENDPOINT DETERMINATION

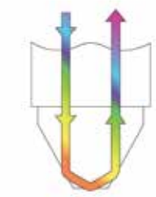
// Polymerization
// Hydrogenation
// Hydrolysis
// Esterification
// Epoxidation

COMMON SAMPLE CHARACTER

// TRANSPARENT OR MODERATELY TURBID SOLUTIONS
// SOLIDS AND POWDERS
// PASTES AND SLURRIES
// EMULSION AND DISPERSION

MEASUREMENT PRINCIPLES

MEASURING PRINCIPLE //	TRANSMISSION (TM)	FLUORESCENCE (FC)	TRANSFLECTION (TF)
	EXCALIBUR RANGE	ESPADA RANGE	FALCATA RANGE
			
	The world's highest quality transmission measuring head guarantees an unmatched precision for your applications. Sophisticated bonding technology and more than 90 years of experience in manufacturing optical parts guarantee a measuring head of the highest quality. Profit from the outstanding reproducibility for your measurements.	By means of a 90° deflection of the incident light, the excitation and fluorescence beams are well separated. Integrated mirrors increase the light yield.	Path length tips can be exchanged quickly and easily to adjust the optical path length between 1 mm and 20 mm. After passing through the solution to be measured, the light beam is reflected by a rear-coated mirror and passes through the solution a second time.

MEASURING PRINCIPLE //	REFLECTION (RF)	ATR (ATR)
	GLADIUS RANGE	KATANA RANGE
		
	The spectrometric measurement of the diffused reflection is a powerful tool for qualitative and quantitative analysis of powdered or granuled solids and compounds. A part of the diffused light penetrates into the surface and thus leads to a probe-specific change in the spectrum, from which inferences for the material properties can be derived.	Ideal for measurements in solvents where the use of epoxy for probe assembly is unsuitable. Probe uses a 3-bounce sapphire ATR crystal, which is directly immersed into the solution.

Standard Products.

THIS OVERVIEW SHOWS A VARIETY OF STANDARD PRODUCTS, WHICH ARE VERY FLEXIBLE IN THEIR USAGE AND AVAILABLE FOR SHORT TERM DELIVERY. THESE IMMERSION PROBES COVERS MANY APPLICATION FIELDS.

TM TRANSMISSON > EXCALIBUR RANGE

EXCALIBUR FLOW-THROUGH CELL FOR PROCESS CONTROL

This Hellma Analytics flow-through cell was developed for on-line measurements where the diameter of the pipe is very small.

Optical Path Length (tolerance +/- 0.04 mm)	1 mm, 2 mm, 5 mm, 10 mm
Outer Diameter	45 mm
Optical Material	Sapphire
Probe Body Material	Stainless Steel 1.4571 (316 Ti)
Length	56 mm (10 mm light path)
Sealing Technology	Kalrez® 7090
Spectral Range	UVS/Vis (240 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	SMA connectors, no external fibers
Temperature Range	5 °C to 260 °C
Pressure Range	-1 bar to 100 bar
Process Connection	Swagelok connectors

	UV	NIR
Path Length mm	**Article Numbers**	
1	663-513-1-U-85	663-513-1-N-85
2	663-513-2-U-85	663-513-2-N-85
5	663-513-5-U-85	663-513-5-N-85
10	663-513-10-U-85	663-513-10-N-85

EXCALIBUR STANDARD IMMERSION PROBE ALL-ROUND PROBE

This classic transmission probe features a broad range of possible applications. Whether for use in the lab, for online monitoring in process environment or even for TDA-measurements – it is always the right choice.

Optical Path Length (tolerance +/- 0.01 mm)	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	Probe head: 15 mm Probe shaft: 18 mm Protective sleeve: 20 mm
Optical Material	Quartz
Probe Body Material	Stainless steel (316 L)
Sealing Technology	Viton, Kalrez® 4079
Spectral Range	UVS/Vis (190 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Immersion Depth	100 mm (10 mm optical path length)

	UVS	NIR
Path Length mm	**Article Numbers**	
1	661-002-1-S-46	661-002-1-N-46
2	661-002-2-S-46	661-002-2-N-46
5	661-002-5-S-46	661-002-5-N-46
10	661-002-10-S-46	661-002-10-N-46
20	661-002-20-S-46	661-002-20-N-46

EXCALIBUR STANDARD IMMERSION PROBE ALL-QUARTZ PROBE

These Hellma Analytics all-quartz probes are outstanding due to its unique design which makes additional sealing material superfluous. This makes them the ideal tool for measuring aggressive samples even at the lowest temperatures – measuring beyond the limits.

Optical Path Length (tolerance +/- 0.01 mm)	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	Probe head: 15 mm Quartz barrel: 18 mm
Optical Material	Quartz
Probe Body Material	Quartz
Sealing Technology	Directly fused
Spectral Range	UVS/Vis (190 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Maximum Immersion Depth	210 mm (10 mm optical path length)

	UVS	NIR
Path Length mm	**Article Numbers**	
1	661-302-1-S-46	661-302-1-N-46
2	661-302-2-S-46	661-302-2-N-46
5	661-302-5-S-46	661-302-5-N-46
10	661-302-10-S-46	661-302-10-N-46
20	661-302-20-S-46	661-302-20-N-46

With vacuum jack for low temperature applications

	UVS	NIR
Path Length mm	**Article Numbers**	
1	661-202-1-S-46	661-202-1-N-46
2	661-202-2-S-46	661-202-2-N-46
5	661-202-5-S-46	661-202-5-N-46
10	661-202-10-S-46	661-202-10-N-46
20	661-202-20-S-46	661-202-20-N-46

EXCALIBUR STANDARD IMMERSION PROBE ALL-QUARTZ PROBE TAPERED VERSION WITH GROUND GLASS JOINT NS 19/35

Optical Path Length (tolerance +/- 0.01 mm)	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	15.5 mm (probe head) Taper NS 19/35 (fits NS 19/26)
Optical Material	Quartz
Probe Body Material	Quartz
Sealing Technology	Directly fused
Spectral Range	UVS/Vis (190 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Maximum Immersion Depth	130 mm (10 mm optical path length)

	UVS	NIR
Path Length mm	**Article Numbers**	
1	661-500-1-S-46	661-500-1-N-46
2	661-500-2-S-46	661-500-2-N-46
5	661-500-5-S-46	661-500-5-N-46
10	661-500-10-S-46	661-500-10-N-46
20	661-500-20-S-46	661-500-20-N-46

FC FLUORESCENCE > ESPADA RANGE

ESPADA STANDARD IMMERSION PROBE

The Hellma Analytics fluorescence immersion probe makes it possible to measure fluorescence outside of a fluorimeter, directly in the medium being investigated. To achieve the best possible separation between the excitation and fluorescence beams, the fluorescent light is captured at a right angle to the incoming beam. A stainless steel casing protects the quartz glass probe head from damage and reduces the amount of incoming ambient light.

Outer Diameter	Probe head: 15 mm Probe shaft: 18 mm Protective sleeve: 20 mm
Optical Material	Quartz
Probe Body Material	Stainless steel (316 L)
Sealing Technology	Viton, Kalrez® 4079
Spectral Range	UVS/Vis (190 nm to 1,100 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 100 °C
Pressure Range	-1 bar to 6 bar
Maximum Immersion Depth	100 mm
Article Number	**661-052-S-46**

THESE TRANSFLECTION IMMERSION PROBES HAVE BEEN SPECIFICALLY DESIGNED FOR LABORATORIES AND SMALL VOLUME ANALYSES. THEY ARE AVAILABLE WITH FIXED PATH LENGTHS AND VERY SMALL OUTER DIAMETERS E.G. 3.2 MM/4 MM/6 MM. THE 6 MM VERSION OFFERS INCREASED FLEXIBILITY DUE TO INTERCHANGEABLE PATH LENGTH TIPS.

FALCATA STANDARD IMMERSION PROBE
with 3.2 mm and 4 mm diameter

These micro immersion probes have been specifically developed for measurements in small volumes. Due to their slim form, less sample material is required for a measurement to be taken.

Optical Path Length (tolerance +/- 0.02 mm)	5 mm, 10 mm
Outer Diameter	3.2 mm/4 mm
Optical Material	Quartz
Probe Body Material	Stainless steel (316 L)
Sealing Technology	Epoxy glue
Spectral Range	UVS/Vis (190 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Maximum Immersion Depth	75 mm/130 mm

Falcata Standard Immersion Probe 3.2 mm diameter		
	UVS	**NIR**
Path Length mm	**Article Numbers**	
5	661-610-5-S-46	661-610-5-N-46
10	661-610-10-S-46	661-610-10-N-46

Falcata Standard Immersion Probe 4 mm diameter		
	UVS	**NIR**
Path Length mm	**Article Numbers**	
5	661-611-5-S-46	661-611-5-N-46
10	661-611-10-S-46	661-611-10-N-46

FALCATA STANDARD IMMERSION PROBE
with 6 mm diameter

Increased flexibility due to interchangeable path length tips.

Optical Path Length (tolerance +/- 0.02 mm)	1 mm, 2 mm, 5 mm, 10 mm, 20 mm
Outer Diameter	6 mm
Optical Material	Quartz
Probe Body Material	Stainless steel (316 L)
Sealing Technology	Epoxy glue
Spectral Range	UVS/Vis (190 nm to 1,100 nm) NIR (400 nm to 2,300 nm)
Fiber Optical Connection	1.80 m external fiber optical cables with SMA connectors
Temperature Range	5 °C to 150 °C
Pressure Range	-1 bar to 6 bar
Maximum Immersion Depth	175 mm

	UVS	**NIR**
Path Length mm	**Article Numbers**	
1/2/5/10/20	661-622-set-S-46	661-622-set-N-46
1	661-622-1-S-46	661-622-1-N-46
2	661-622-2-S-46	661-622-2-N-46
5	661-622-5-S-46	661-622-5-N-46
10	661-622-10-S-46	661-622-10-N-46
20	661-622-20-S-46	661-622-20-N-46

Accessories interchangeable Path Length tips	
	Path Length tips
Path Length mm	**Article Numbers**
1	665-622-1-40
2	665-622-2-40
5	665-622-5-40
10	665-622-10-40
20	665-622-20-40

Accessories – STANDARD PRODUCTS

EXTERNAL CELL HOLDER

The external cell holder is useful when the spectrophotometer does not have an internal cell holder or when measurements with cells are to be made at some distance from the spectrophotometer e.g. in a fume hood. To connect this cell holder properly to your system you will require, 2×1m fiber optic cables in the corresponding spectral range. You should select the option "SMA-Collimator".

Material	Aluminium, Black Anodised
Dimensions	123 mm x 40 mm x 45 mm
Temperature of solution in cell	Max. 120 °C (Quartz Cells Only)
Ambient temperature	Max. 50 °C
Fiber Optic Cables	These must be ordered separately.
Notes	Suitable for cells with path length 1 mm to 20 mm
Article Number	664-15-71

FIBER OPTIC INTERFACE

This accessory is to be used when SMA sockets are not available on your spectrophotometer. To connect this interface properly to your system you will require, in addition to your probe, 2×1m fiber optic cables in the corresponding spectral range. You should select the option "SMA-Collimator". The SMA end is connected to your probe via a small SMA/SMA adapter and the collimating ends are plugged into the interface.

Effective Aperture	4 mm diameter
Outside Dimensions	60 mm x 12.5 mm x 12.5 mm
Center Height	8.5/15/20 mm
Spectral Range	190 nm to 2300 nm, depends on cables used
Notes	Other center heights on request
Article Number	662-85-UVNIR-46 662-15-UVNIR-46 662-20-UVNIR-46

STANDARD FIBER OPTIC CABLES

Fiber optic cables can be supplied with either SMA connectors or special collimating lenses to suit the application that they are being used for. Fibers are protected by metal silicon coverings.

Core Diameter	600 µm
Numerical Aperture	0.22
Beam Diameter (lens)	3.7 mm
Max. Temperature	150 °C

ACCESSORY SMA/SMA ADAPTER

Article number	041-500-74

SPECTRAL RANGE	LENGTH	SMA – SMA Article Number	SMA – KOLLIMATOR Article Number	COLLIMATOR – COLLIMATOR Article Number
NIR (400 nm – 2300 nm)	1 m	ALN001LSS	ALN001LSC	ALN001LCC
	2 m	ALN002LSS	ALN002LSC	ALN002LCC
	3 m	ALN003LSS	ALN003LSC	ALN003LCC
	4 m	ALN004LSS	ALN004LSC	ALN004LCC
	5 m	ALN005LSS	ALN005LSC	ALN005LCC
	6 m	ALN006LSS	ALN006LSC	ALN006LCC
	7 m	ALN007LSS	ALN007LSC	ALN007LCC
	8 m	ALN008LSS	ALN008LSC	ALN008LCC
UVS/Vis (190 nm – 1100 nm)	1 m	ALS001LSS	ALS001LSC	ALS001LCC
	2 m	ALS002LSS	ALS002LSC	ALS002LCC
	3 m	ALS003LSS	ALS003LSC	ALS003LCC
	4 m	ALS004LSS	ALS004LSC	ALS004LCC
	5 m	ALS005LSS	ALS005LSC	ALS005LCC
	6 m	ALS006LSS	ALS006LSC	ALS006LCC
	7 m	ALS007LSS	ALS007LSC	ALS007LCC
	8 m	ALS008LSS	ALS008LSC	ALS008LCC

Modular Program.

THE BUILDING BLOCKS OF OUR MODULAR PROGRAM

WE OFFER YOU A WIDE VARIETY OF OPTIONS TO DESIGN AND BUILD YOUR INDIVIDUALIZED PROBE.

TOP-INNOVATION
More than **500,000** options possible.

OPTICAL PATH LENGTHS //

» 1 mm » 2 mm » 5 mm
» 10 mm » 20 mm

OPTICAL MATERIALS //

» **Quartz Glass:** Best optical performance
» **Sapphire:** Robust and highly resistant

PROBE BODY MATERIALS //

» **Stainless Steel:** 1.4571 (316 Ti), 1.4435 (316 L)
» **Hastelloy®:** C 22 (2.4602)
» **Titanium:** Grade 2 (3.7035)
» **Tantalum**

PROBE BODY DIAMETERS //

» 6 mm » 12 mm
» 20 mm » 25 mm

TEMPERATURE RANGE //

» **Several options from - 80 °C to 300 °C**

SEALING TECHNOLOGIES //

» **Kalrez®:** 6375
» **Kalrez®:** 4079
» **Kalrez®:** 7075
» **Brazed Titanium and Sapphire**

IMMERSION DEPTH //

» **Choose your immersion depth up to 900 mm**

PRESSURE RANGE //

» **Several options from -1 bar to 300 bar**

SEVERAL FLANGE OPTIONS //

» **Flanges, ANSI, GOST, JIS, quick change fittings and more**

SPECTRAL RANGE //

» **NIR** (Quartz/Sapphire: 400 nm to 2,300 nm)
» **UVS-Vis Range** (Quartz: 190 nm to 1,100 nm/ Sapphire: 240 nm to 1,100 nm)

ADDITIONAL OPTIONS //

» **For further probe options see individual data sheet**

Material certificates upon request.

IMMERSION PROBE FOR PAT SOLUTIONS. CONNECTION TO SPECTROPHOTOMETER BY SMA CONNECTORS OR INTERFACE AND FIBER OPTICAL CABLES.

Kalrez® is a registered trademark of DuPont Performance Elastomers L.L.C.
Hastelloy® is a registered trademark name of Haynes International, Inc.

START YOUR PROBE CONFIGURATION NOW!

FIND YOUR INDIVIDUAL PROBE THROUGH OUR MODULAR DESIGN PRINCIPLE.

YOU COULDN'T FIND A SUITABLE IMMERSION PROBE IN THE STANDARD PROGRAM? NO PROBLEM! THE WORLDS' ONLY CONFIGURATOR FOR OPTICAL IMMERSION PROBES ALLOWS YOU TO BUILD YOUR INDIVIDUAL IMMERSION PROBE IN A FEW MINUTES! TRY IT FOR YOURSELF ONLINE – IT IS SO EASY TO USE AND SAVES A LOT OF TIME:
www.myPATprobe.com

01. **Choose a measuring method based on your application.**

02. **Choose from Standard Series immersion probes or build your individual immersion probe.**

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Configuration, requests, ordering and much more information.
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Modular Immersion Probes – EXCALIBUR RANGE

THE EXCALIBUR IMMERSION PROBES ARE BUILT FOR TRANSPARENT AND LIQUID SOLUTIONS. THEY WITHSTAND EXTREME PROCESS CONDITIONS AND DUE TO THEIR MONOLITHIC MEASURING HEAD THESE PROBES ARE THE BEST SOLUTION FOR HIGHEST DEMANDS.

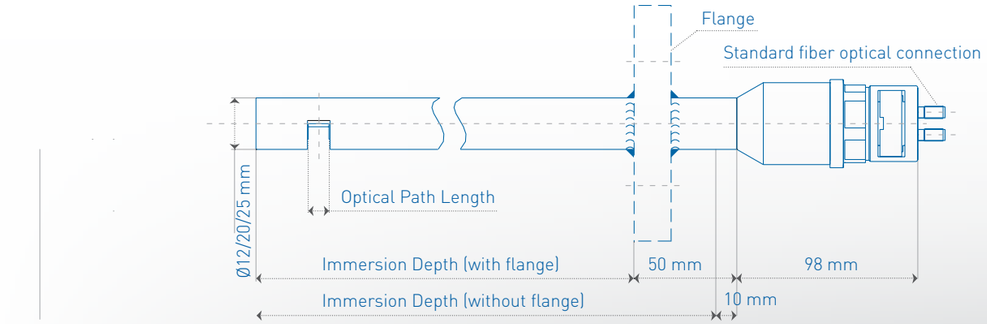
Common applications include:

Reaction monitoring in chemical synthesis
Control of process chromatography
Color number determination
Reaction endpoint determination

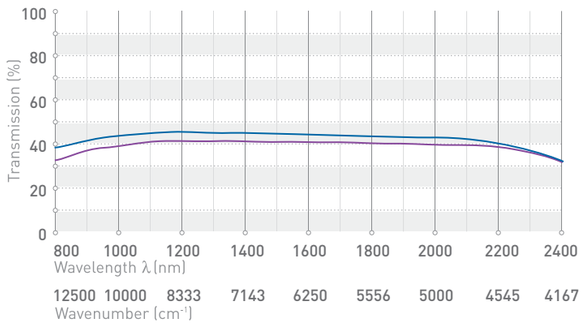
PROFIT FROM CLEAR ADVANTAGES

// **Monolithic** measuring head
// Extremely high **pathlength accuracy**
// Highly **chemical resistant**
// **Easy scale up** from lab to process
// **Easy to clean**
// **Minimum** possible stray light
// **Minimal** service required
// **Compatible** with most spectrophotometers

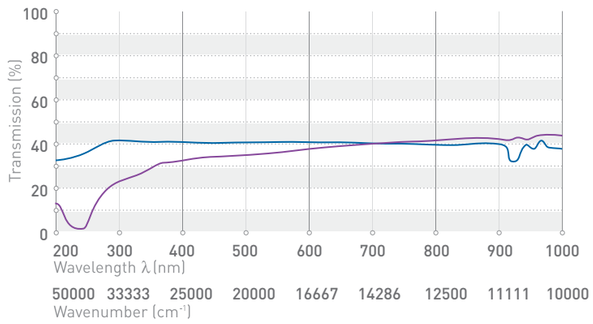
SCHEMATIC DRAWING



NIR EXCALIBUR (OPTICAL PATH LENGTH 2 mm) //



UVS-Vis EXCALIBUR (OPTICAL PATH LENGTH 10 mm) //



USE THE INTERNET CONFIGURATOR OR THE TABLE BELOW TO CONFIGURE YOUR MODULAR IMMERSION PROBE.

www.myPATprobe.com

| | | |

Modular Immersion Probes – FALCATA RANGE

THE FALCATA TRANSFLECTION PROBES HAVE BEEN SPECIFICALLY DESIGNED FOR THE USE IN LABORATORIES AND PILOT PLANTS. THEY PROVIDE HIGH FLEXIBILITY AND CAN BE USED IN A MULTITUDE OF APPLICATIONS DUE TO THEIR HIGH DEGREE OF FLEXIBILITY REALIZED THROUGH THE INTERCHANGEABLE OPTICAL PATH LENGTH TIPS.

Common applications include:

use in multipurpose plants
fermentation processes
organic chemical process development

PROFIT FROM CLEAR ADVANTAGES

// **Variable light paths** due to interchangeable light path tips

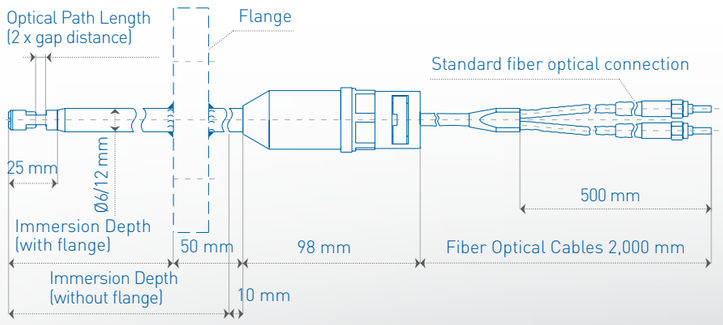
// **100 %** reproducibility

// due to the small diameter, only **low sample volume** is required

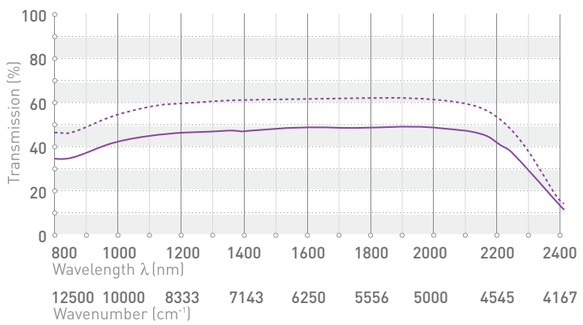
// withstands even the **toughest process conditions**

// due to the flexible design we can easily adapt to **rapidly changing** process conditions

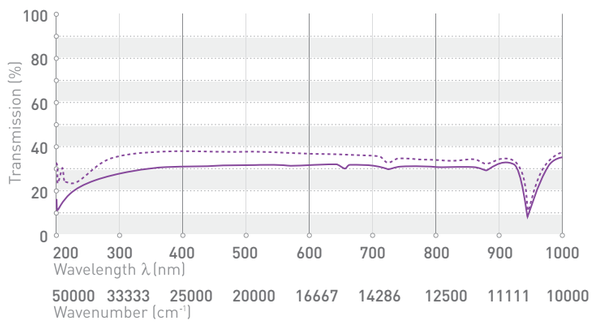
SCHEMATIC DRAWING



NIR FALCATA (OPTICAL PATH LENGTH 2 mm) //



UVS-Vis FALCATA (OPTICAL PATH LENGTH 2 mm) //



Quartz glass & Sapphire (Falcata 12)
Quartz glass & Sapphire (Falcata 6)

Quartz glass & Sapphire (Falcata 12)
Quartz glass & Sapphire (Falcata 6)

USE THE INTERNET CONFIGURATOR OR THE TABLE BELOW TO CONFIGURE YOUR MODULAR IMMERSION PROBE.

BASE MODEL
- F1 Falcata 6
- F2 Falcata 12

The figures behind the product name indicate the different outer diameter (in mm) of the probes.

OPTICAL PATH LENGTH TIP
- A 1 mm
- B 2 mm
- C 5 mm
- D 10 mm
- E 20 mm
- F Complete Set (1 mm to 20 mm)

refer to page 20 for additional Path Length Tips
Quartz = tolerance 0.01 mm
Sapphire = tolerance 0.05 mm
Red = Standard configuration
Only applies to non brazed configuration.

OPTICAL MATERIAL
- Q Quartz
- S Sapphire

PROBE BODY MATERIAL
- E Stainless Steel 1.4435 (316 L)
- H Hastelloy® C-22 (2.4602)
- T Titanium Grade 2
- X Tantalum (only for Falcata 12)

SEALING TECHNOLOGY
- Z Kalrez® 6375
- X Kalrez® 4079
- B Brazed (only in combination with brazed Titanium and Sapphire and 1 single welded optical path length tip)

SPECTRAL RANGE
- N NIR (400 nm to 2,300 nm)
- U UVS/Vis Low solarization (190 nm to 1,100 nm for quartz/ 240 nm to 1,100 nm for Sapphire)

FIBER OPTICAL CONNECTION
- E 2 m external fiber optical cables and PMA housing with SMA connectors
- B 2 m external fiber optical cables and ATEX proof PMA housing with SMA connectors
- S Female sockets for SMA (no external fibers) and PMA housing
- A Female sockets for SMA (no external fibers) and ATEX proof PMA housing

PROCESS CONNECTION
- A No Flange
- B DN 25/PN 40 Typ 05 Form A (EN 1092-1)
- C DN 50/PN 40 Typ 05 Form A (EN 1092-1)
- D DN 80/PN 40 Typ 05 Form A (EN 1092-1)
- E ASME 1" B 16.5 150 lbs RF (ANSI)
- F ASME 1.5" B 16.5 150 lbs RF (ANSI)
- H ASME 2" B 16.5 150 lbs RF (ANSI)
- I JIS 10K20A
- J GOST DN 25/PN 40
- Q Quick Change Fitting, PG 13.5

only applies to Falcata 12

TEMPERATURE RANGE
- L 5 °C to 180 °C
- H -80 °C to 300 °C (only in combination with brazed Titanium and Sapphire)

PRESSURE RANGE
- L -1 bar to 35 bar (without flange) or according to flange specifications
- B -1 bar to 100 bar (only applies to Falcata 6)
- D -1 bar to 300 bar (without flange) or according to flange specifications (only in combination with brazed Titanium and Sapphire)

IMMERSION DEPTH
- 210 mm
- 060 mm to 209 mm
- 211 mm to 400 mm
- 401 mm to 600 mm
- Length for quick change fittings with 120 mm
- Length for quick change fittings with 225 mm

PURGING
- N No
- Y Yes (only for fiber optical connection with female sockets)

ARTICLE NUMBER	P														
EXAMPLE NUMBER FALCATA 6	P	F	1	F	Q	E	Z	N	E	A	L	B	2	1	0	N

Don´t forget the accessories! Fiber optical cables and other accessories can be found on page 20.

Configuration options do not fit your needs? We are also able to build customized optical immersion probes suitable for virtually every process condition.

Modular Immersion Probes – GLADIUS RANGE

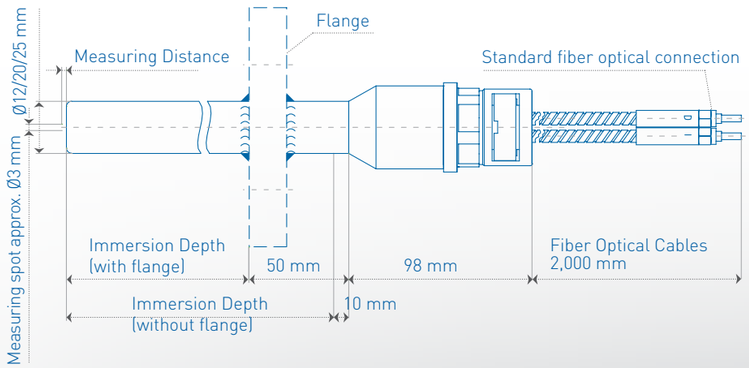
GLADIUS REFLECTION IMMERSION PROBES ARE ESPECIALLY SUITABLE FOR MEASUREMENT OF DIFFUSED REFLECTION IN THE VIS AND NIR RANGE WITH FT-NIR SPECTROMETERS OR DIODE ARRAY SPECTROMETERS.

Common applications include:
Non invasive determination of residual moisture, e.g. in dryers

Qualitative and quantitative analysis of food composition

Reaction monitoring in heterogeneous systems

SCHEMATIC DRAWING



PROFIT FROM CLEAR ADVANTAGES

// **Uniform lighting** of the probe using 7 ringform light fiber with 400 µm or 600 µm core diameter

// Return of the **diffused reflected light** for detection in the spectrometer is via the central detector fiber(s)

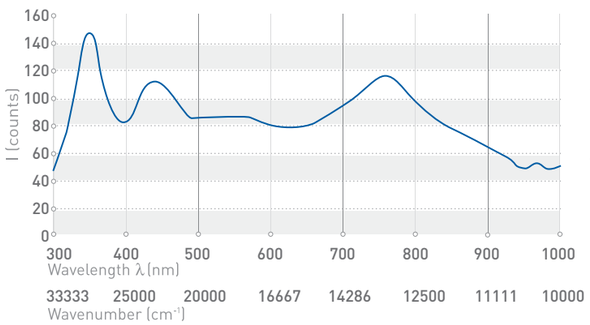
// Arrangement of the fiber to the central receiver fiber(s) at a 30° angle: for suppression of direct reflection and **highly effective** reduction of the stray light

// Customer-specified adjustment of the measuring distance for **optimum signal**

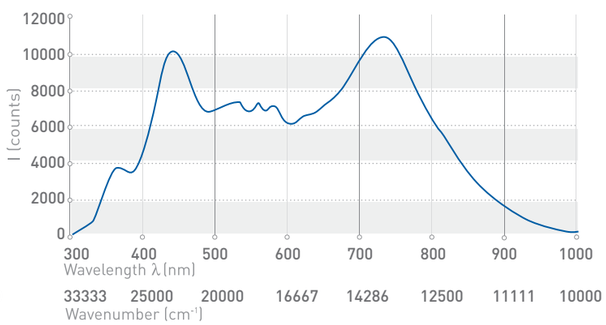
// **Rugged and hygienic** design enable various applications, e.g. processes in which the composition of bulk goods and compounds or the moisture content of powders and granules must be monitored

// CIP-compatible (Cleaning in Place) Cleaning **without expensive** disassembly

BACKGROUND SIGNAL //



TYPICAL SPECTRUM OF DIFFUSE WHITE STANDARD //



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USE THE INTERNET CONFIGURATOR OR THE TABLE BELOW TO CONFIGURE YOUR MODULAR IMMERSION PROBE.

BASE MODEL	**G2** Gladius 12 **G3** Gladius 20 **G4** Gladius 25	The figures behind the product name indicate the different outer diameter (in mm) of the probes.																
MEASURING MODE		**A** Distance (approx. 2.0 mm) **B** Contact	Red = Standard configuration															
OPTICAL MATERIAL			**S** Sapphire **Q** Quartz															
PROBE BODY MATERIAL				**E** Stainless Steel 1.4435 (316 L) **H** Hastelloy® C-22 (2.4602) **T** Titanium Grade 2														
SEALING TECHNOLOGY					**E** EPDM **K** Kalrez® 6221 **B** Brazed (only in combination with brazed Titanium and Sapphire)													
FIBER OPTICAL CABLE CONFIGURATION						**J** NIR (400 nm to 2,300 nm) 7×400/1×600 (2×SMA) **K** NIR (400 nm to 2,300 nm) 7×600/7×600 (2×SMA) **L** NIR (400 nm to 2,300 nm) 7×600/7×600 (14×SMA) **M** UVS/Vis (240 nm to 1,100 for sapphire/ 190 nm to 1,100 nm for quartz) 7×200/1×600 **O** UVS/Vis (240 nm to 1,100 for sapphire/ 190 nm to 1,100 nm for quartz) 7×400/1×600									
FIBER OPTICAL CONNECTION							**E** 2 m external fiber optical cables and PMA housing with SMA connectors **B** 2 m external fiber optical cables and ATEX proof PMA housing with SMA connectors **F** Female sockets for SMA (no external fibers) and PMA connector (only for 7 *200/1 * 600 configuration) **A** Female sockets for SMA (no external fibers) and ATEX proof PMA housing								
PROCESS CONNECTION								**A** No Flange **B** DN 25/PN 40 Typ 05 Form A (EN 1092-1) **C** DN 50/PN 40 Typ 05 Form A (EN 1092-1) **D** DN 80/PN 40 Typ 05 Form A (EN 1092-1) **E** ASME 1" B 16.5 150 lbs RF (ANSI) **F** ASME 1.5" B 16.5 150 lbs RF (ANSI) **H** ASME 2" B 16.5 150 lbs RF (ANSI) **V** Varivent Typ N **S** 1.5" Sanitary pipe fitting **K** Ingold fitting (only in combination with Gladius 25) **Q** Quick Change Fitting, PG 13.5 (Only in combination with Gladius 12)							
TEMPERATURE RANGE									**T** 5 °C to 140 °C **I** -80 °C to 260 °C (only in combination with brazed Titanium and Sapphire)								
PRESSURE RANGE										**M** -1 bar to 16 bar (without flange) or according to flange specification **H** -1 bar to 100 bar (without flange) or according to flange specifications (only in combination with brazed Titanium and Sapphire)								
IMMERSION DEPTH											240 mm 060 mm to 239 mm 241 mm to 400 mm 401 mm to 700 mm 701 mm to 900 mm Length for quick change fittings with 120 mm Length for quick change fittings with 225 mm							
PURGING												**N** No **Y** Yes						
ARTICLE NUMBER	P																	
EXAMPLE NUMBER GLADIUS 12	P	G	2	A	S	E	E	J	E	A	T	M	2	4	0	N		

Don´t forget the accessories! Fiber optical cables and other accessories can be found on page 20.

Configuration options do not fit your needs? We are also able to build customized optical immersion probes suitable for virtually every process condition.

MODULAR PROGRAM

Modular Immersion Probes – KATANA RANGE

KATANA ATR IMMERSION PROBES ARE SUITABLE FOR CONDITIONS INVOLVING THE DIRECT MEASUREMENT OF STRONGLY ABSORBING SOLUTIONS WHERE STANDARD TRANSMISSION PROBES CANNOT BE USED.

Common applications include:

Reaction monitoring in chemical synthesis
Control of process chromatography
Color number determination
Reaction endpoint determination

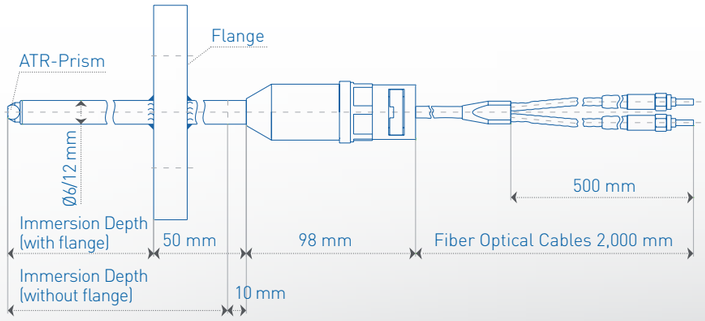
PROFIT FROM CLEAR ADVANTAGES

// **Extremely short** optical path length (approx. 1 µm) ensures maximum **measuring sensitivity**

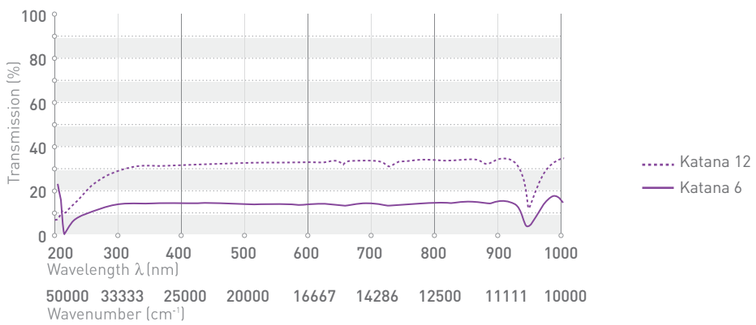
// **Absorbance** takes place in the evanescent field

// Optical path length depends on **Spectral Range, number of reflections** and **refractive index of solution**

SCHEMATIC DRAWING



UVS-VIS KATANA (ONLY AVAILABLE WITH SAPPHIRE) //



www.myPATprobe.com

USE THE INTERNET CONFIGURATOR OR THE TABLE BELOW TO CONFIGURE YOUR MODULAR IMMERSION PROBE.

BASE MODEL
- K1 Katana 6
- K2 Katana 12

The figures behind the product name indicate the different outer diameter (in mm) of the probes.

ATR-PRISM
- A 3-Bounce

Red = Standard configuration

OPTICAL MATERIAL
- S Sapphire

PROBE BODY MATERIAL
- E Stainless Steel 1.4435 (316 L)
- H Hastelloy® C-22 (2.4602)
- T Titanium Grade 2

SEALING TECHNOLOGY
- Z Kalrez® 6375
- X Kalrez® 4079
- B Brazed (only in combination with brazed Titanium and Sapphire)

SPECTRAL RANGE
- L UVS/Vis low solarization (240 nm to 1,100 nm for sapphire)
- N NIR (400 nm to 2,300 nm)

FIBER OPTICAL CONNECTION
- E 2 m external fiber optical cables and PMA housing with SMA connectors
- B 2 m external fiber optical cables and ATEX proof PMA housing with SMA connectors
- S Female sockets for SMA (no external fibers) and PMA connector
- A Female sockets for SMA (no external fibers) and ATEX proof PMA housing

PROCESS CONNECTION
- A No Flange
- B DN 25/PN 40 Typ 05 Form A (EN 1092-1)
- C DN 50/PN 40 Typ 05 Form A (EN 1092-1)
- D DN 80/PN 40 Typ 05 Form A (EN 1092-1)
- E ASME 1" B 16.5 150 lbs RF (ANSI)
- F ASME 1.5" B 16.5 150 lbs RF (ANSI)
- H ASME 2" B 16.5 150 lbs RF (ANSI)
- I JIS 10K20A
- J GOST DN 25/PN 40
- Q Quick Change Fitting, PG 13.5

only applies to Katana 12

TEMPERATURE RANGE
- L 5 °C to 180 °C
- H -80 °C to 300 °C (only in combination with brazed Titanium and Sapphire

PRESSURE RANGE
- M -1 bar to 16 bar (without flange) or according to flange specifications
- H -1 bar to 100 bar (only without flange) or according to flange specifications (only in combination with brazed Titanium and Sapphire)

IMMERSION DEPTH
- 210 mm
- 060 mm to 209 mm
- 211 mm to 400 mm
- 401 mm to 600 mm
- Length for quick change fittings with 120 mm
- Length for quick change fittings with 225 mm

PURGING
- N No
- Y Yes (only for fiber optical connection with female sockets)

ARTICLE NUMBER	P		A	S									
EXAMPLE NUMBER KATANA 6	P	K 1	A	S	E	Z	L	E	A	L	M	2 1 0	N

Don´t forget the accessories! Fiber optical cables and other accessories can be found on page 20.

Configuration options do not fit your needs? We are also able to build customized optical immersion probes suitable for virtually every process condition.

MODULAR PROGRAM

www.myPATprobe.com

Accessories – MODULAR PROGRAM

COMPLETE YOUR SYSTEM SOLUTION WITH OUR WIDE RANGE OF ACCESSORIES.

PMA PRODUCTS

TYPE	PMA CONDUIT		PMA HOUSING	
DESCRIPTION	Standard NW 17/NW 23 NW = inner diameter (mm)	ATEX-EX-System NW 17/NW 23 NW = inner diameter (mm)	PMA process housing NW 17 with M 20 x 1.5 mm NW 23 with M 32 x 1.5 mm	PMA ATEX-Ex-System housing (only in combination with ATEX-Ex-System PMA conduit)

Depending upon your configuration most users will require 1 additional PMA housing and ("x"m) length of PMA conduit to enclose and protect their fiber optic cable system.

The PMA CONDUIT protects the fiber cables of the immersion probe. The conduit comes with an additional PMA connector which can be connected e.g. to a connector box.

PMA housings are used to complete the connection between the PMA conduits. The housings provide a solid foundation for affixing the PMA conduit. All Hellma Analytics process probes are delivered with a PMA housing attached to the probe body.

PMA CONDUITS (IMMERSION PROBE NEEDS TO BE EQUIPPED WITH PMA HOUSING)

PMA HOUSING	S PMA housing NW 17 (only applies to Katana and Falcata series) A PMA housing NW 23 N No housing NW 17 W No housing NW 23						
PMA HOUSING-TYPE		B PMA Standard E PMA ATEX-Ex-System					
Choose type and fill in total desired length in (m)			PMA conduit PCLT PMA ATEX Ex-System conduit (only in combination with ATEX-Ex-System PMA housing)				
ARTICLE NUMBER	APMA						
EXAMPLE NUMBER	APMA	S	E	0	2	5	PMA NW 17 housing + PMA ATEX + 25 m ATEX conduit

INTERCHANGEABLE PATH LENGTH TIPS FOR FALCATA RANGE

MODEL	F1 Falcata 6 F2 Falcata 12					
OPTICAL PATH LENGTH TIP		A 1 mm B 2 mm C 5 mm D 10 mm E 20 mm				
OPTICAL MATERIAL			Q Quartz S Sapphire			
PROBE BODY MATERIAL				E Stainless Steel 1.4435 (316 L) H Hastelloy C-22 (2.4602)		
SEALING TECHNOLOGY					Z Kalrez 6375 X Kalrez 4079	
ARTICLE NUMBER	P					
EXAMPLE NUMBER	P	F1	B	Q	E	Z

FIBER OPTIC CABLES STANDARD

TWO CABLES ARE REQUIRED TO COMPLETE THE FIBER OPTICAL CONNECTION

MODE	SPECTRAL RANGE	LENGTH	STAINLESS STEEL COVER	RUBBERIZED COVER	PE COATING
			Article Number	Article Number	Article Number
STANDARD FEATURES **Connectors (both ends):** FSMA Type **Temperature Range:** - 40° C to 150° C **Protective Sleeve** **Stainless Steel Core Material:** Stainless **Diameter:** 600 µm **Numerical Aperture (NA):** 0.22	NIR (400 nm – 2,300 nm)	1 m	ALN001S	ALN001R	ALN001T
		2 m	ALN002S	ALN002R	ALN002T
		3 m	ALN003S	ALN003R	ALN003T
		4 m	ALN004S	ALN004R	ALN004T
		5 m	ALN005S	ALN005R	ALN005T
	UVS/Vis (190 nm – 1,100 nm)	1 m	ALS001S	ALS001R	ALS001T
		2 m	ALS002S	ALS002R	ALS002T
		3 m	ALS003S	ALS003R	ALS003T
		4 m	ALS004S	ALS004R	ALS004T
		5 m	ALS005S	ALS005R	ALS005T

FIBER OPTIC CABLES (FSMA-FSMA) MODULAR SYSTEM

SPECTRAL RANGE	N NIR (400 nm to 2,300 nm) S UVS/Vis low solarization (190 nm to 1,100 nm)					
LENGTH PLEASE FILL IN BELOW		NIR from 6 – 120 m UVS/Vis from 6 to 10 m				
PROTECTIVE SLEEVE MATERIAL			S Stainless Steel "Included" R Rubberized (only up to 10 meters) T PE coated			
ARTICLE NUMBER	AL					
EXAMPLE NUMBER	AL	N	0	0	6	R

Custom Products.

SPECIAL IDEAS OR EXTRAORDINARY REQUIREMENTS? WE MAKE IT POSSIBLE!

WITH OVER 90 YEARS OF EXPERIENCE IN BUILDING HIGH END OPTICAL PRODUCTS, HELLMA ANALYTICS IS ABLE TO OFFER CUSTOMIZED OPTICAL IMMERSION PROBES AND FLOW-THROUGH CELLS SUITABLE FOR NEARLY EVERY DEMAND. **THESE CUSTOM PRODUCTS ARE NEITHER STANDARD NOR MODULAR PRODUCTS. THEY ARE BUILT TO SUIT YOUR UNIQUE SPECIFICATIONS – EVEN IF THEY ARE EXTRAORDINARY.** OUR CUSTOM PRODUCTS CAN COVER A WIDE VARIETY OF POSSIBLE APPLICATION PARAMETERS, MATERIALS, DIMENSIONS AND SPECIFICATIONS. TALK TO US ABOUT YOUR REQUIREMENTS AND WE'LL CREATE YOUR INDIVIDUAL SOLUTION.

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for a fast quotation procedure
www.myPATprobe.com/questionnaire

APPLICATION //

ETCHING BATHS POLYMERIZATION FOOD AND FEED BEVERAGES
OIL, GAS, WATER PHARMA CHEMISTRY

SIZE //

MINIMAL Diameter of Immersion probe body Ø 2.4 mm **MAXIMAL** Length Immersion depth 6 m

PRESSURE //

LOWEST -1 bar **HIGHEST** (750 bar, tested with 1.125 bar)

TEMPERATURE //

LOWEST -180 °C **HIGHEST** 300 °C

MATERIALS //

STANDARD Stainless Steel PTFE Titanium Tantalum **CUSTOM**

SOLVENTS RANGE //

ACIDS HF H2SO4 METHANOL CH2CL2 CH3OH NAOH KOH **ALKALINES**

CUSTOM PRODUCTS AT A GLANCE

TM **TRANSMISSION** > EXCALIBUR RANGE

EXCALIBUR CUSTOM IMMERSION PROBE "HYGIENIC DESIGN PROBE"

TYPE 661.2304

Special features:
// Hygienic design
// Electropolished
// Ideal for food & beverage and pharmaceutical industry

EXCALIBUR CUSTOM IMMERSION PROBE "PTFE PROBE"

TYPE 661.2310

Special features:
// completely made of PTFE
// withstands extremely corrosive conditions
// Ideal for wet processes e.g. in photovoltaic and semiconductor industries

EXCALIBUR CUSTOM IMMERSION PROBE "POLYMER PROBE" (PAIR)

TYPE 661.2350

Special features:
// For harsh conditions
// withstands extremely high temperatures and pressures
// Ideal for extruder machines

EXCALIBUR CUSTOM FLOW THROUGH CELL "PTFE FLOW THROUGH CELL"

TYPE 663.514

Special features:
// Combination of Sapphire optics and molded PTFE
// Absolutely corrosion resistant
// Broadened measuring chamber for constant flow rate

EXCALIBUR CUSTOM FLOW THROUGH CELL

TYPE 663.517

Special features:
// Available with quartz or sapphire optics
// flexible usage for inline and online analysis
// easy to incorporate into pipe systems and bypass loops

EXCALIBUR CUSTOM IMMERSION PROBE "ALL QUARTZ PROCESS PROBE"

TYPE 661.7031

Special features:
// Solid quartz glass probe with a bonded glass flange for extremely corrosive environments.
// This probe is free of O-rings and contains a bonded quartz glass measuring head.
// Due to its design and the physical properties of quartz glass this probe has a broad temperature range from -180 °C to 300 °C and beyond.

EXCALIBUR CUSTOM IMMERSION PROBE "VERTICAL SLIT PROBE"

TYPE 661.082

Special features:
// Measurement of highly viscous solvents
// High resistance to chemicals
// Optimised flow geometry
// Material Quartz

EXCALIBUR CUSTOM IMMERSION PROBE "DOUBLE LANCE PROBE"

TYPE 661.7010

Special features:
// Measures UVS and NIR simultaneously
// Extremely high lightpath accuracy
// Length 1 m

TALK TO US ABOUT YOUR REQUIREMENTS AND SPECIFICATIONS. WE'LL OFFER YOU AN INDIVIDUAL SOLUTION TO A REASONABLE PRICE!

TM **TRANSMISSION** > EXCALIBUR RANGE

EXCALIBUR CUSTOM IMMERSION PROBE “CLEANING NOZZLE PROBE“

TYPE 661.977

Special features:

// An external cleaning nozzle enables cleaning of the optics without removing the probe

// Very useful for highly viscous mediums enabling stable measurement results

RF **REFLECTION** > GLADIUS RANGE

GLADIUS CUSTOM IMMERSION PROBE “POLYMER PROBE”

TYPE 668.045

Special features:

// Withstands harsh conditions

// High temperature and pressure usage

// Ideal for polymer melt processes

TM **TRANSMISSION** > EXCALIBUR RANGE

EXCALIBUR CUSTOM IMMERSION PROBE “ULTRA LONG PROBE“

TYPE 661.971

Special features:

// 6 m immersion depth

// Exchangeable measuring head

// Double barrier for total secured operation in highly dangerous mediums

// Due to ultra long design probe can be placed into underground tanks

ATR **ATR** > KATANA RANGE

KATANA CUSTOM IMMERSION PROBE CARRIER

TYPE 661.997

Special features:

// Two ports for a sealed installation of individual immersion probes

// Cleaning and calibrating in process (CIP)

// Very compact construction according to hygiene regulations

DEMO MODELS

IN QUARTZ GLASS AND SAPPHIRE AVAILABLE!
IN CASE OF PURCHASE ANY RENTAL FEES INCURRED WILL BE CREDITED.

Your desired immersion probe is not in the program? No problem! We manufacture according to your individual needs – just contact us.

TF **TRANSFLECTION** > FALCATA RANGE

FALCATA CUSTOM IMMERSION PROBE “TANTALUM PROBE“

TYPE 661.6009

Special features:

// Probe body made of Tantalum, Optics made of quartz glass

// Extremely robust and acid resistant (even aqua regia)

// Exchangeable path length tips

TM **TRANSMISSION** > EXCALIBUR RANGE

EXCALIBUR CUSTOM IMMERSION PROBE “ULTRA ROBUST PROBE“

TYPE 661.7060

Special features:

// Ultra robust cage to protect optics and barrel from agglomerating particles

// Protruding Sapphire windows for enhanced flow through properties and to prevent measuring gap from getting blocked

Our brochures provide detailed information about the appropriate product groups and in addition, offer thematic information as well as handling advice.

Hellma® Analytics

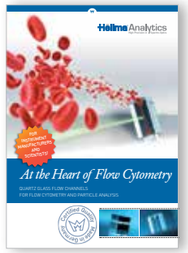
Download:
www.hellma-analytics.com/download

PRODUCT BROCHURES

Product Catalogue
BestCellers

Optical Immersion Probes
Fiber Optical Flow Cells

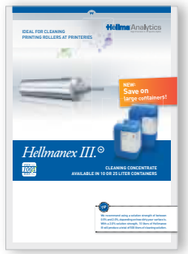
THEMATIC INFORMATION



Flow Cytometry and
Particle Analysis

UV/Vis Reference
Materials

TrayCell
Ultra-Micro-Cell



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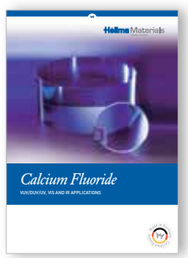
PRODUCT BROCHURES



Calcium Fluoride
Raw material and optical components

NOTES

Hellma® Analytics
High Precision in Spectro-Optics

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